

Broadband Wireless Standards

Outputs

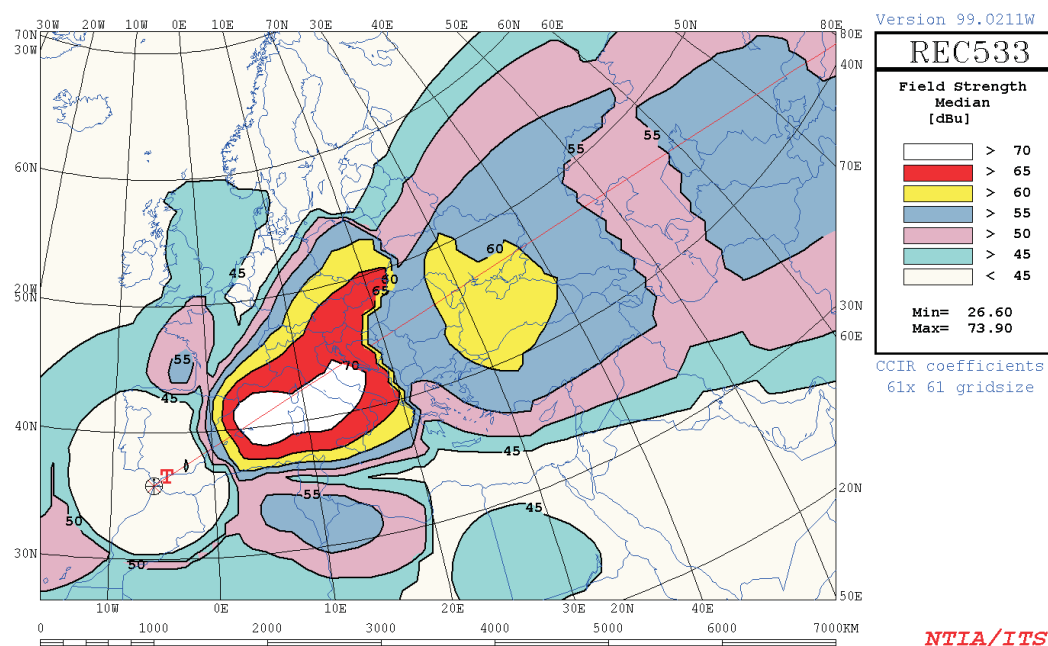
- Preparation of technical standards and documents for the ITU-R that support the U.S. interest in broadband wireless systems.
- Development of new radio propagation algorithms or methods that improve spectrum usage of wireless systems.

Wireless communication has seen tremendous growth in recent years, in both the number of users and the types of new services, beyond simply voice communications. In particular, there has been an emphasis on Internet and broadband data uses. These additional users and new services require greater bandwidths than before, which for wireless users means more radio spectrum. As growing numbers of users require ever more spectrum, it is necessary to be able to predict signal coverage for various wireless services more accurately, so that everyone can share the available spectrum and peacefully

coexist without interference. The development of radio-wave propagation prediction models for accurate prediction of signal coverage supports broadband wireless standards for these broadband wireless systems.

Historically, radio propagation model development tended to be very service specific, with models for the broadcast FM radio and television service or for the land mobile radio service and little or no overlap in applicability between the models for different services. This service specific approach was adequate for a regulatory philosophy that assigned different, exclusive blocks of the radio spectrum to different services in a proprietary fashion. However, this lack of overlap between models can also create an impediment to the shared use of spectrum by different services or wireless applications, because, for example, a model that is used to predict intra-service system availability and interference might not also apply flexibly and accurately to inter-service interference predictions. To overcome this problem, ITS

TANGIER, Morocco [HR 4/4/.5] 500kW 57deg 18ut 11.850MHz JUN 100ssn DBU
Tx location to grid of Rx AREADATA\DEFAULT\DEF61X61.R11



Output from the High Frequency propagation software for international frequency coordination,
developed by the ITU and maintained by ITS.

and other research organizations have been developing and evaluating propagation models to predict wireless signal coverage more accurately and flexibly, both within and across services.

The ITS Irregular Terrain Model (ITM) is one such general purpose model for the prediction of radio propagation over tropospheric circuits, in the frequency range 20 MHz – 20 GHz. This model may be used for radio propagation predictions in its area (i.e., site-general) mode, when little, if any, detailed information is available for the path. It may also be used for radio propagation predictions in its point-to-point (i.e., site-specific) mode, when detailed terrain elevation data are available for the path. For either mode, the model first generates the predicted reference attenuation (i.e., the computed median attenuation in excess of free space) as a function of distance, based on three ranges, corresponding to the dominant radio propagation mechanisms in these ranges: line-of-sight, diffraction and tropospheric scatter. This computed reference attenuation is then modified by the desired quantiles of the time, location and situation variabilities, combined as necessary to give reliability and confidence estimates.

ITS participates in the international development of radio propagation prediction models that can be used by spectrum managers and system planners of land mobile, terrestrial broadcast, maritime mobile and certain applicable fixed (e.g., point-to-multipoint) services, among others. ITS supports this effort by participation in the International Telecommunication Union — Radiocommunication Sector (ITU-R) Study Group 3 (Radiowave Propagation). Study Group 3 recently developed and adopted a radio propagation model which blends features that the different services had previously used independently, thereby clarifying and unifying planning and coordination activities across these services. This recommendation, Recommendation ITU-R P.1546, is usually considered to be a site-general model, although, for improved accuracy, it specifies numerous adjustments and corrections to the basic method that are very nearly site-specific in their application. In preparation for the recently-held first session of the Regional Radio Conference (RRC-04) and to support the work of the Intersessional Planning Group (IPG) established by the RRC-04,¹ Study Group 3,

Working Party 3K (WP 3K, point-to-area propagation) and, in particular, Subgroup 3K-2 have undertaken a number of significant revisions of Recommendation ITU-R P.1546. For several years, an ITS engineer has served as chairman of Subgroup 3K-2.

As a much needed adjunct to this work, Subgroup 3K-1 of WP 3K and Study Group 3 is examining and evaluating proposals for the use of several different site-specific radio propagation models that are broadly applicable and flexible for intra- and inter-service planning and coordination uses, when detailed terrain elevation data are available. ITS, in cooperation with U.S. Study Group 3, has submitted two U.S. contributions to WP 3K proposing the ITM (point-to-point mode) and a closely related hybrid radio propagation model, based on Recommendations ITU-R P.1546 and P.452. The performance of these models will be thoroughly evaluated in the upcoming year with the results of these studies provided to WP 3K through further U.S. contributions.

In addition to the above areas, WP 3K deals with propagation aspects of short-path personal communications and wireless local area networks (WLAN) in the frequency range 300 MHz to 100 GHz, and wireless access systems in these frequency ranges. Time permitting, recently obtained propagation data for dense and moderate urban and suburban environments will be submitted as additional U.S. contributions to WP 3K.

ITS also participates in the work of Working Parties 3J (propagation fundamentals), 3M (point-to-point propagation, earth-space propagation, interference and coordination) and 3L (ionospheric propagation). ITS continues to be responsible for the HF (3–30 MHz) propagation software developed by the ITU for international frequency coordination. The ITU website, <http://www.itu.int/ITU-R/software/study-groups/rsg3/databanks/ionosph/index.html>, links to an ITS web site with the following reference, HF sky-wave propagation (Rec. P.533) (available from the ITS web site) <http://elbert.its.bldrdoc.gov/hf.html>. An example of the type of output that the software can produce is shown in the figure on the previous page.

¹ The RRC-04 is the first of two scheduled sessions of the international conference to establish agreements and standards for the coordination and planning of digital terrestrial broadcast services (radio and television) in parts of the ITU-R's Regions 1 and 3 of the world.

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